

# **ACCESS TO SCIENCE, ENGINEERING AND AGRICULTURE: MATHEMATICS 2**

**MATH00040**

**SEMESTER 2 2017/2018**

**DR. ANTHONY BROWN**

The objective of this course is to build on Mathematics I and to expose you to various mathematical techniques that you may need if you decide to study a degree. It will develop your knowledge of calculus obtained in Semester 1 and will also introduce topics such as matrices, vectors, complex numbers and probability.

## **Lecture notes**

Lecture notes, exercises and assignments will be available to download as the course progresses from Blackboard, which can be accessed through UCD Connect. It can also be useful to bookmark the direct login which can be found at <https://elearning.ucd.ie/webapps/login/> since this sometimes works even if UCD Connect is down. I will also upload the materials to <http://www.ucd.ie/msc/access/math00040materials/>

## **Textbooks**

There is no need to buy a book to study this course but if you would like an extra reference, then a good one is 'Mathematics for Engineers: A Modern Interactive Approach' by Anthony Croft and Robert Davison. This can be found in the library and in the Maths Support Centre (see below).

## **Classes**

These will be held in the Science Hub and will run in the following rooms at the following dates and times:

Wednesday January 24th : 18.00-21.30, Room H2.40

Wednesday January 31st : 20.00-21.30, Room H1.49

Saturday February 3rd : 10.00-13.00, Room H2.38

Wednesday February 7th : 20.00-21.30, Room H1.49

Wednesday February 14th : 20.00-21.30, Room H1.49

Saturday February 17th : 10.00-13.00, Room H2.38

Wednesday February 21st : 19.30-21.30, Room H2.40

Wednesday February 28th : 18.00-21.30, Room H1.49

Wednesday March 7th : 19.30-21.30, Room H2.40

Saturday March 10th : 10.00-13.00, Room H2.38  
Wednesday March 28th : 19.30-21.30, Room H2.40  
Wednesday April 4th : 18.00-21.30, Room H2.40  
Wednesday April 11th : 18.00-21.00, Room H2.40

### **Continuous Assessment**

This will consist of four assignments during the semester.

### **Exam**

There will be a two hour exam at the end of the semester.

### **Grading Policy**

The continuous assessment will count for 25% of the final mark and the exam will count for the other 75%.

Please note that grading scheme is different from some other modules:

A+	90-100%
A	80-89.99%
A-	70-79.99%

For the entire table see <http://mathsci.ucd.ie/tl/grading/en02>.

### **Contact details**

If you wish to contact me outside class times then my contact details are as follows.

- My e-mail address is [anthony.brown@ucd.ie](mailto:anthony.brown@ucd.ie)
- My mobile number is 087-9947027.
- My office is Room G.19 on the ground floor of Science North. However it is vital to e-mail or phone me beforehand to make sure I will be there, and also since you need a swipe card to even get to outside the office.
- It will probably be more convenient for you to meet me in the Maths Support Centre.

### **Maths Support Centre**

The Maths Support Centre provides a free service to students of UCD who want to improve their mathematics. It is very much intended for students of all abilities. It is just as much for a student who wants to move from an A to an A+ as it is for a student who wants to move from an E to an D. It is situated in the James Joyce Library Building in Belfield, you will find it just to the left after you enter the library through the turnstiles.

You are welcome to visit either when I am there or when I am not there. This service is completely confidential: if you visit at a time when I am not there, although I will be able to see a list of the subjects covered, I will not be able to see the

names or student numbers of anyone who attends. Note that my ordinary hours in the Maths Support Centre are from 14.00-17.00 on Mondays and 10.00-13.00 on Tuesdays (but please also see below about the special sessions). Details of the opening hours of the Maths Support Centre will be posted on the website. It will be open for drop-in visits from Week 2 of term (i.e., the week beginning January 29th).

As well as the regular opening hours, I will be running a special session each week specifically for Access Students. These will run from 16.00-17.30 on Wednesdays starting (probably) on January 31st. I would strongly recommend that you attend these sessions if at all possible. It is my experience that they really do make a substantial difference to your final grade. The idea is that you will work together and do problems in groups. I will be there to help you out if you get stuck. A new feature this year are the sessions that run from 18.00-19.30 on Mondays to Thursdays. These prioritise mature, HEAR, DARE and international students and they will be very useful if you can't attend the sessions I will be running, due to work or other commitments.

## Syllabus

- (1) Matrices and Vectors.
  - Mechanics of matrix algebra.
  - Systems of linear equations.
  - Gaussian elimination.
  - Inverses.
  - Determinants.
  - The dot product and angles.
  - The cross product.
  - Eigenvalues and eigenvectors.
- (2) Complex numbers.
  - Algebra of complex numbers.
  - Polar form and De Moivre's formula.
  - Roots of complex numbers.
- (3) Differential calculus
  - Product and quotient rules.
  - Composite functions and the chain rule.
  - Critical points.
  - Global and local maxima and minima.
  - The second derivative test.
  - The Newton-Raphson method.
- (4) Integral calculus.
  - Integration by substitution.
  - Integration by parts.
  - Partial fractions.
  - Finding areas and volumes.

(5) Probability.

- Introduction to probability.
- Addition and multiplication rules.
- Probability distributions: binomial, Poisson and normal.